



Early Journal Content on JSTOR, Free to Anyone in the World

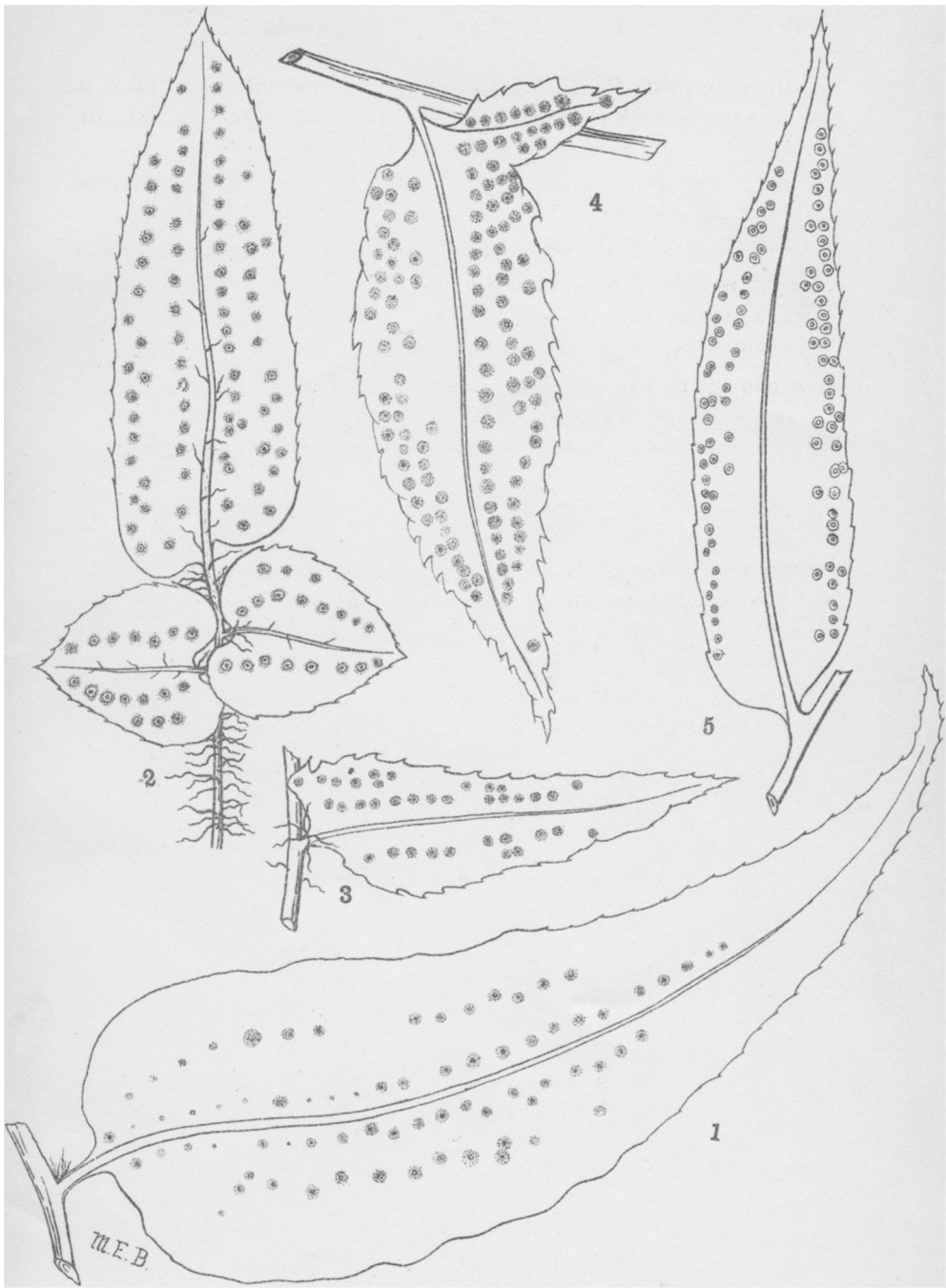
This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

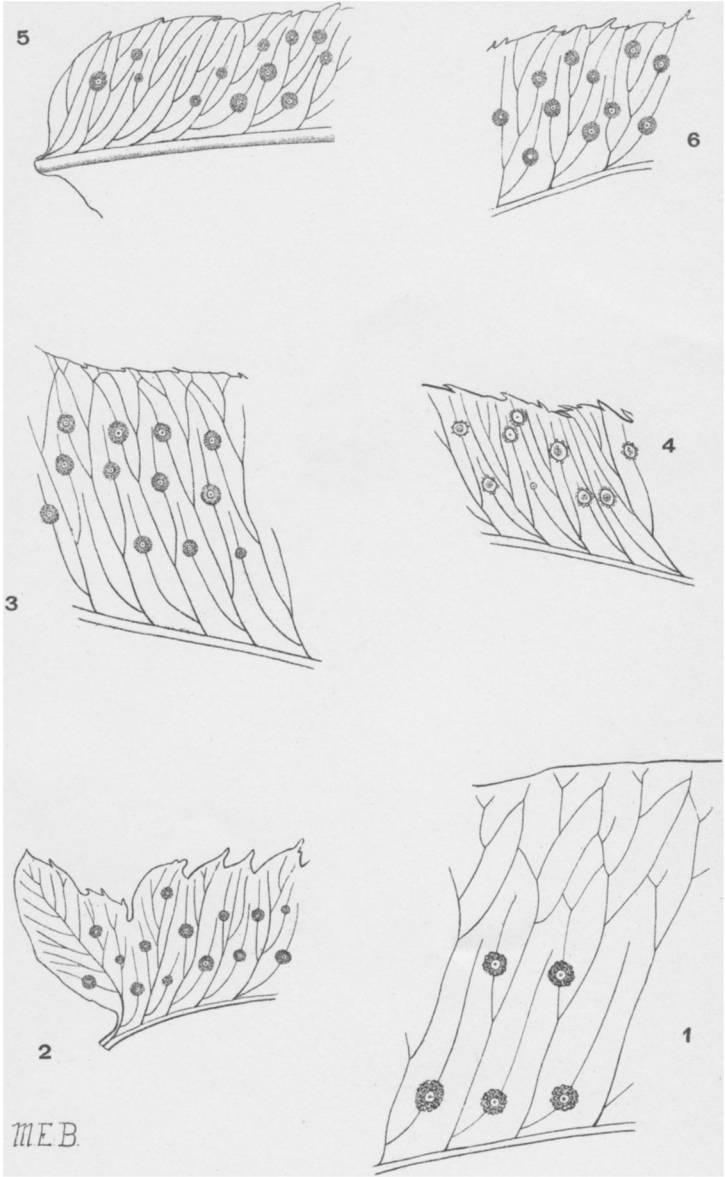
We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.



PHANEROPHLEBIA.



PHANEROPHLEBIA.

BULLETIN
OF THE
TORREY BOTANICAL CLUB

MAY 1899

American Ferns—II. The Genus *Phanerophlebia*

BY LUCIEN MARCUS UNDERWOOD

(PLATES 359, 360)

During the past generation it has been customary for English and American botanists to refer to a single species, *Aspidium juglandifolium*, a long series of widely different ferns from Mexico, Central America and Venezuela. The original *Polypodium juglandifolium* was described from Caripe, Venezuela, by Humboldt, and his type is in the Willdenow herbarium. The relation of our own flora to this species commenced with the discovery of a plant on the Mexican Boundary Survey * which was referred to this species although it specifically resembles the type almost as little as it does *Polystichum acrostichoides* or any one of a half dozen species.

Several species have been separated from time to time by Schlectendal, by Martens and Galeotti, and later by Fournier. The latter in his list of the Ferns of Mexico † distinguishes five species but his knowledge of the typical form appears to have been somewhat at fault. Later still, Mr. Hemsley ‡ following Mr. Baker, unites all these divergent plants under a single species and the forty-three specimens at Kew are included under a single cover.

* Under the head of *Aspidium juglandifolium* in Eaton's Ferns of North America, we have the curious anomaly of a description of one species, a figure drawn from a second, details of venation from a third, and the name of a fourth given to the aggregation.

† Mexicanas Plantas, 1: 100. 1872.

‡ Biologia Centrali-Americana, 3: 642. 1885.

The genus *Phanerophlebia* (Presl, Tent. Pteridogr. 84. 1836) was established by Presl together with the genus *Amblia* (Presl, Tent. Pteridogr. 184. 1836) the former founded on *P. nobilis** and the latter on *P. juglandifolia*, the genera differing only in the supposed absence of indusia in the latter genus. It represents a somewhat natural group of plants of the Aspidieae with once pinnate leaves, coriaceous or herbaceous habit and 3-4-forked veins which in some species unite more or less copiously in the outer portions of the pinnae and in others remain free. In the species with normally free veins, however, accidental areolae sometimes appear. John Smith (in his later writings) and Moore united this genus with *Cyrtomium* whose type is the common *C. falcatum* of cultivation, but in that species and its allies a widely different type of venation occurs which in our judgment is sufficient for generic distinction. The relations of this genus to other generic groups which have been united under *Aspidium*, *Nephrodium*, and other names will be discussed later in this series of papers.

The genus *Phanerophlebia* has a limited distribution, ranging from the northern coast of South America to Arizona and New Mexico. There are at least eight species which may be easily separated as follows:

Veins regularly and copiously anastomosing.

Pinnae 5-11, 4-5 cm. wide; inner line of sori near the midrib.

1. *P. juglandifolia*.

Pinnae 16-20, 2-3 cm. or less wide; inner line of sori 3-5 mm. from the midrib.

3. *P. remotispora*.

Veins free or exceptionally anastomosing at rare intervals.

Pinnae 3-5, cordate at base.

2. *P. pumila*.

Pinnae 10-30, acute or obliquely obtuse at base.

Pinnae 7-15 cm. long, normally set at an angle of 50-75° with rachis.

Pinnae mostly auricled on the upper side of the base.

6. *P. auriculata*.

Pinnae obtuse or acute at base, not auricled.

Inner line of sori near the midrib; rachises smooth.

4. *P. nobilis*.

Inner line of sori 4 mm. from midrib; rachises scaly.

5. *P. umbonata*.

* While this genus is nominally founded on *P. nobilis*, the description and figure of the venation show a plant with anastomosing veins and it is more than probable that *P. remotispora*, a species not separated until over thirty years later, was the plant Presl had in hand. This point, which does not affect the establishment and validity of the genus, can probably be settled by an examination of Presl's plant at Prag.

Pinnæ 18-20 cm. or more long; normally set at an angle of 30-40° with the rachis.

Sori in a single row with two others incomplete, 2.5 mm. in diameter.

7. *P. macrosora*.

Sori usually in four or less complete rows, small, 1.2 mm. wide.

8. *P. Guatemalensis*.

1. PHANEROPHLEBIA JUGLANDIFOLIA (H. & B.) J. Sm. Hook. Jour. Bot. 4: 187. 1842.

Polypodium juglandifolium Humb. & Bonp.; Willd. Sp. Pl. 5: 195. 1810.

Aspidium juglandifolium Kunze, Linnaea 20: 363. 1847.

Cyrtomium juglandifolium Moore, Index Filicum, lxxxiii. 1857.

Amblya juglandifolia Presl. Tent. Pterid. 185. pl. 7. f. 3. 1836.

Rootstock short, ascending, with few scales: stipes slender, rarely with a few straggling scales, stramineous, 30-40 cm. long: pinnæ 5-11 (mostly 7-9), 3-5 cm. apart, often with a tuft of tomentose scales in the axils, the terminal largest, 20 x 5 cm., the lowest smallest, 12 x 4.5 cm., often falcate; base obtuse; apex acute and often strongly acuminate; margin undulate below, becoming more and more distinctly serrulate toward the apex; texture subcoriaceous with a cartilaginous margin which extends into short rigid teeth, 0.5 mm. long; veins anastomosing throughout, the first row of areolæ elongate, 1.5 cm., mostly with a free included veinlet which bears the first sorus about a millimeter from the base, the outer areolæ smaller: sori 1.5 mm. across, the inner series 2 mm. from the midrib, the second series 5-7 mm. further out, a partial third series 2 mm. still farther removed from the midrib.

The type of this species is in Willdenow's collection at Berlin and is marked 434 Caripe,* Humboldt. This is almost exactly matched by a considerable number of specimens in various collections as follows:†

* Caripe, not always shown on the maps, is near the north coast of Venezuela, 28 kilometers S. S. E. from Cumana.

† In the citation of specimens it is desirable to indicate in what collections specimens have been examined, both to convey information as to where specimens of any given species can be consulted and because of variations existing under the same number of certain collectors. In this paper the herbaria are designated as follows:—B, Berlin;—C, Columbia;—D, Davenport (Massachusetts Horticultural Society);—E, D. C. Eaton, New Haven;—G, Gray, Cambridge;—K, Kew;—N, United States National Museum, Washington;—P, Philadelphia Academy of Sciences;—U, the writer's own collection.

VENEZUELA: Humboldt, 434 (B); Miguel, 20 (K); Buschel, (K, E); Funcke, 211 (K); Otto, 644 (K); Linden, 164 (K); Fendler, 233, in part (E, P).

[COLUMBIA: Andes Bogotenses, Triana.]

GUATEMALA: Salvin & Godman, 113 (G, K); J. Donnell Smith, 1051 (K); 768 (K, G, C, P).

MEXICO—*Chiapas*: Ghiesbreght, 414 (K, G, E).

The typical form of this species from Venezuela is well named *juglandifolium*, as the resemblance to walnut leaves is very striking. The Guatemalan specimens of Salvin and Godman are provided with slightly larger pinnae (terminal 20 × 6 cm., lower lateral 20 × 5 cm. scarcely falcate) and with more pronounced bristle teeth; the Mexican specimens have smaller pinnae, 12 × 2.5–3 cm., and also more pronounced bristle teeth. All agree in the basal and apical characters of the pinnae, venation, position of sori, the number of pinnae and the general habit.

Much is still to be desired regarding the rootstock. The Venezuelan specimens collected by Fendler and distributed under no. 233 are quite different from each other. That of Eaton's collection and the one in Short's herbarium at the Philadelphia Academy are nearly normal, but those of the Kew and Gray herbaria are younger, show more scaly rootstock, longer stipes with quite large dark-brown scales, and with a larger number of sori, the outer rows being more irregular, particularly in the specimen in Herb. Gray. A second species is clearly involved under this number.

The species is, however, very sharply circumscribed, its geographical limits are clearly marked, and it is not to be confused with the very distinct species found farther north.

2. PHANEROPHLEBIA PUMILA (Mart. & Galeotti) Fée, Gen. Filicum, 282. 1852.

Aspidium pumilum Martens & Galeotti, Mém. sur les Fougères du Mexique, 64. pl. 17. f. 1. 1844.

Aspidium juglandifolium D. C. Eaton, Ferns of North America, 2: pl. 75. f. 5–8.

Rootstock so far as known short and compact: stipes clustered, 5–11 cm. long, stramineous or brownish, densely scaly with nar-

row slender lanceolate scales: pinnae 1-5 (in one rare case 10), the terminal much the largest, 6-10 cm. long, 2.5-2.8 cm. wide, the lateral 3-3.5 cm. long, 2-2.5 wide, all cordate at the base, the terminal normally acute, the lateral mostly obtuse except for the terminal spine; margins with projecting spines 1 mm. long: sori in two usually complete rows with occasionally scattering outliers, the inner row 1-3 mm. from midrib, the second row 2-3 mm. farther out: veins free, 2-4 times forked, the sori borne mostly on the middle of the alternating branches.

MEXICO [*Oaxaca*: Galeotti, 6251]. *Chiapas*: Ghiesbreght (K, G, E, U); Linden, 1552 (K).

There appears to be considerable variation in the number of pinnae though the predominating number is 3 as seen by the following series examined:

Ghiesbreght (Hb. Eaton) 1, 2, 3, 3, 3, 3, 3, 4; (Hb. Gray) 3, 5, 5, 10*; (Hb. Underwood) 2, 4; (Nat. Herb.) 5; (Hb. Kew) 3, 3, 3, 5, 5, 5, 5; Linden (Hb. Kew) 3, 3, 3, 3.

The relation of this species to *P. Lindeni* is not clear. Of the latter I have seen only the Kew specimen (Chiapas, Linden, 1551) which is represented by two leaves with the following measurements: terminal pinnae 14 × 3 cm., lateral 9 × 2.3 cm., the terminal remote (2.5-3 cm.) from the lateral, all the pinnae taper-pointed.† In one of the leaves there is an auriculate base on each lateral pinna. In Eaton's specimen of *P. pumila* there is a single leaf strikingly similar to Linden, 1551, but smaller and totally unlike any of the other specimens of the sheet. This leaf is disconnected from the other specimens, so may belong to a different plant from the rooted specimen; its dimensions are: stipe 17 cm., terminal 10 × 2.3 cm., lateral 6.5 × 1.7 cm. While there is no question that we have in *P. pumila* a species totally distinct from any other of the group, only field work will determine whether we do not also have two. In other words *P. Lindeni* may be a distinct species.

3. PHANEROPHLEBIA REMOTISPORE Fourn. Mex. Plantas 1: 100.
1872.

Rootstock unknown: stipes 35-40 cm. long, stramineous,

* This leaf, which is separate from the other three which constitute the specimen, is also peculiar in showing broadly obtuse almost truncate bases to the lateral pinnae and an acute apex and with a falcate upper curve.

† It should be noticed that the pinnae of Linden's 1552 are more acute than in Ghiesbreght's specimens.

with broad brownish scales on the lower fourth, naked above: leaf 35–40 cm. long, with 16–20 pinnae which are 10 cm. or more long, 1.5–2.8 cm. wide, unequally obtuse or slightly acute at base, the apex tapering, slightly falcate; margin prickly, the spines more or less appressed near the base, more spreading at the apex; terminal pinnae slightly larger: veins anastomosing, the first branch from each vein bearing a sorus above its middle, either ending as a free included veinlet or rarely uniting with some other vein: sori small, 1 mm. or less in diameter, in two or three rows, the innermost row 3–5 mm. from the midrib.

The type of this plant was collected in Orizaba by Bourgeau, 2349, and appears to extend from southeastern Mexico to Guatemala.

MEXICO—*Vera Cruz*: Orizaba, Bourgeau, 2349 (K, N, G, C, E), 2348 (C); Mohr, 87 (E); Müller, 729 (C); Witmer, 99 (P). Xalapa, Coulter, 1712 (K). Cordoba, Schaffner, 23 (K); Kerber, 69 (K). Mirador, Liebmann (K, G).

GUATEMALA: J. D. Smith, 3259 (K, N, C).

The Guatemala specimens have narrower pinnae and fewer of slightly larger sori. Specimens are also in the Kew Herbarium from Mexico collected by Graham, 404, and from Zhuitlancella, 2349. In the Gray collection is a single plant collected in Xalapa by Charles L. Smith, mounted on two sheets, that has a lamina 75 cm. in length and with a stout stipe 65 cm. long. Except for its greatly enlarged size, its relations are with this species. At least without more data we would not care to separate it. It has 36 pinnae, the lowest 18×3 cm. with four or more rows of small sori on either side. It is more than probable that Fée's illustration of *P. juglandifolia* Gen. Fil., *pl.* 22 *B. f.* 1. is taken from this species rather than the one he attempts to illustrate.

4. PHANEROPHLEBIA NOBILIS (Schlecht.) Fée, Gen. Fil. 282. *pl.* 22 *B. f.* 2. 1852.

Aspidium nobile Schlecht. Linnaea, 5: 610. 1830.

Rootstock stout, creeping, the bases of the stipes with large shining brown scales: stipes 22–30 cm. long, pale brown: leaves 40 cm. or more long, with 15–23 pinnae which are 12–15 cm. long, 2.3–2.8 cm. wide, with obliquely obtuse bases and tapering curved apices; margins spiny, the spines more pronounced in the upper half of the pinna: veins free, about three times forked, the first branch bearing the sorus below the middle: sori small or

medium-sized, in about three rows, the innermost row less than 2 mm. from the midrib.

Apparently confined to central Southern Mexico. Specimens have been seen as follows:

MEXICO: San Nicolas, Bourgeau, 1049 (K, N, G, C, E*).
San Luis Potosi: Schaffner (K, U). *Mexico*: Circa urbem Mexici, Schmitz, 26 (K). *Vera Cruz*: Oaxaca, Galeotti, 6554 (K); [Laguna de la Hacienda, Schiede]. Cañada, Bilemek, 474 (G, K); Orizaba? Müller, 48 (E); Cordoba, Bourgeau, 1645 (N).

This species can be easily distinguished from *P. remotispora*, which it closely resembles in size and habit, by its free veins and its inner row of sori located near the midrib. The original was collected by Schiede and Deppe as noted above.

5. *Phanerophlebia umbonata* sp. nov.

Rootstock stout, solid: stipes 15–30 cm. long, pale brown with a few broader scattered scales in the lower portion, and a considerable number of narrow slender ones above which also appear throughout the rachis: leaves 35–50 cm. long, with 25–38 pinnae which are 9–16 cm. long, 2–2.5 cm. wide, with an acute or obtusish base and tapering apex; margins bristly, the bristles scarcely projecting; veins free, very closely placed, usually three times forked, all the branches except the first extending to the margin: sori in about two rows, with a few scattering outliers, the innermost row about 4 mm. from the midrib; indusia remaining flat, with a central depression, and the center elevated into a distinct umbo.

Cool shaded cañons near Monterey, State of Nueva Leon, Mexico. C. G. Pringle, 14 June, 1888.

This plant was at first considered by Mr. Davenport as distinct from *juglandifolium* as indicated in our correspondence. The plant was issued in Mr. Pringle's sets without a specific name, but Mr. Davenport finally yielded his early impression and reported it under that convenient catch-all of the genus which *juglandifolium* has become through its treatment at Kew. American botanists of the past generation have regarded this treatment as authoritative, in spite of the vigorous protests of Moore, John Smith, Fée, Fournier, Mettenius and Kunze, variously expressed in the literature of the past forty years.

* Two pinnae "ex herb Gray."

There is nothing in the extensive collection at Kew, which numbers 43 specimens in this group, to match this species. Its relations are closest to *P. nobilis* and *P. remotispora*; from the former it differs among other points in its remote sori; from the latter in its free veins; from both in its larger number of pinnae, its scaly rachis and its very characteristic indusium.

We have seen specimens of the distribution in the Kew, Gray, Columbia, National, Eaton, Davenport and Philadelphia Academy herbaria, besides our own specimens, and they show very little tendency to vary.

6. *Phanerophlebia auriculata* sp. nov.

Rootstock short, creeping, densely covered with the bases of the persistent stipes, pale greenish, stramineous, 10–18 cm. long, with abundant dark brown lanceolate scales which become narrower above and almost hair-like: pinnae 10–16, rarely exceeding this number, forming a leaf 15–30 cm. long, the terminal practically the same size as the others, 5–7 cm. long, 2–2.5 cm. wide; lateral pinnae unequal at base, the lower angle obliquely truncate, the upper usually developed into a well-marked auricle; margins strongly serrate, sometimes more deeply incised, the teeth ending in sharp prickles projecting from the margin at an angle of 30°–40°; texture thin; veins free, 1–3-forked: sori in 2 more or less clearly marked rows with scattering sori between them and beyond the outer row.

This is the plant that has too long masqueraded as the representative of *Aspidium juglandifolium* from the Southwest, but has no close resemblance to that species, in habit, foliage, venation or texture. Although not the first collected, we shall assume Pringle, no. 831, from “cool damp cliffs, Mapula Mountains, Chihuahua, October, 1886,” as the type of the species since it is more widely represented in collections and more representative. The first collected plants of this species we have seen are in Kew labeled simply Mexico, Dr. Coulter, 1713, and though possessing a greater number of pinnae (20) than the type are clearly this species. The first collection within the limits of the United States was made in Western Texas on the Mexican Boundary Survey near “Hueco Tanks and Van Horn’s Wells.” The only specimen from this collection is in the Columbia Herbarium and is marked *Aspidium juglandifolium* Kze., D. C. Eaton, January, 1880.”

It was next collected by Mr. and Mrs. Lemmon, August 12, 1882, in "Conservatory Cañon," Huachuca Mountains, Arizona, and ten years later by Professor E. O. Wooton in the Organ Mountains, New Mexico. The range of the plant is quite circumscribed as it appears to be confined to northern Mexico and the adjacent portions of the United States. The following may be referred here.

MEXICO—*Chihuahua*: Pringle, 831 (K, G, N, C, P, U) Palmer, 450 (K, E, N, P); Hartman, 578 (K, G) (plants mostly immature).

ARIZONA: Lemmon, August, 1882 (K, E, G, U, N).

NEW MEXICO: Wooton, May, 1892 (U).

TEXAS: Mexican Boundary Survey (C).

7. *Phanerophlebia macrosora* (Baker)

Aspidium juglandifolium, var. *macrosorum* Baker, Jour. of Bot. 25: 25. 1887.

Rootstock unknown: stipes brownish, the color extending throughout the rachis: pinnae coriaceous, brownish in drying, 2.5–3 cm. apart, 18–20 cm. long, 2.5 cm. wide, the apex tapering, the base unequally cuneate with a distinct cartilaginous margin and brownish spines throughout: veins free, 3 times forked, the primary branch rising from near the base, short, bearing the sorus near its middle: sori very large, hemispheric, 2.5 mm. in diameter, forming a continuous inner row 2 mm. from the midvein and one or two more or less irregular outer rows leaving a considerable bare space near the margin.

COSTA RICA: J. J. Cooper (K, G).

This very distinct plant was distinguished by Mr. Baker as a variety but we can discover no close relation to *juglandifolium** to which he united it. It does not appear to be closely related to any of the described species of the group, but does show a striking affinity with the next species with which it forms a somewhat natural group. It is known only from its type locality unless the imperfect specimen at Kew collected by Skinner in Guatemala should belong here. There are no specimens in the U. S. National Herbarium, although the original material was sent thence to Mr. Baker.

* Mr. Baker's brief description is as follows: "veins all free, conspicuously raised; sori much longer [*sic*] than in the type"

8. *Phanerophlebia Guatemalensis* sp. nov.

Rootstock unknown: stipes pale brownish, smooth: pinnae 20×3.5 cm., tapering at the apex, acute at base, with spinulose margins; veins free, prominent beneath in drying, four or more often five-forked: sori small, 1.2 mm. wide, mostly flattish in usually four rows either side the midvein, about equally distributed over the entire width of the pinnae: indusium small, withering.

GUATEMALA: San Miguel Uspantán, Depart. Quiché, alt. 7000. J. Donnell Smith, 3241 (G, N, P).

The specimen under this number in the Columbia Herbarium may be this species but more likely is something else. The plant is younger, the pinnae are smaller, the rachis is scaly, and its habit is quite different. There is a second Guatemalan plant in the Gray herbarium, collected by O. Salvin, that belongs here, as does another of the same collection at Kew. A tip of another specimen at Kew collected by Skinner is probably the same, although the pinnae are larger (27×4 cm.). The species finds its nearest alliance with *P. macrosora* but is abundantly distinct.

The geographic distribution of the known species may be compared more readily from the following map, in which the numbers of the stations correspond to the serial numbers of the species.



Distribution of the species of *Phanerophlebia*: 1. *P. juglandifolia*, 2. *P. pumila*, 3. *P. remotispora*, 4. *P. nobilis*, 5. *P. umbonata*, 6. *P. auriculata*, 7. *P. macrosora*, 8. *P. Guatemalensis*.

INCERTAE SEDIS

1. *P. Lindenii* Fournier, Mex. Plantas 1: 100. pl. 4. 1872.

As stated above there is considerable uncertainty regarding the relations of this species to *P. pumila*. Further collections will be necessary either to establish the validity of this species or reduce it to synonymy. Represented at Kew by Linden, 1551, collected in Chiapas.

2. In the Kew Herbarium is a specimen marked "Popocatepec., Mexique" Schaffner, no. 277, which is represented by a single leaf nearly a meter long, of which 45 cm. is stipe. The stipe is blackish at base, brownish, and then stramineous with occasional scales: pinnae 21, approximate in pairs, strongly bristly throughout, with a series of scattered scales everywhere on the veins beneath; the veins are free and the sori are in three rows very much as in *P. nobilis* which the plant resembles in many ways. Further material is here necessary to determine its position.

3. The specimens in the Kew and Gray herbariums collected by Fendler in Venezuela and distributed under no. 233 are not *P. juglandifolia* but present material is insufficient to determine its relations. It will thus be seen that while much is known of the genus, much yet remains to learn regarding complete distribution of the species.

The data presented by the above study illustrate several principles of wide application in the study of our flora, and particularly that portion of it which connects directly with the flora of Mexico and the West Indies, where, of necessity, the early types are found in the herbaria of the old world.

1. The necessity for the American flora to be monographed by Americans in whom some conception of distribution is apparent from the better perspective inherent in natives of a large country.

2. The coördinate necessity for American monographers to consult the large European collections before completing their studies of relationship and distribution. An earlier examination of Willdenow's type in this instance would have prevented much of the difficulty which has resulted from the misinterpretations of both Europeans and Americans. Few European botanists have taken the trouble to consult types on their own continent outside of the herbaria in which they work; consequently, for the study of the American flora, Americans must do this and do it systematically.

3. The uncertainty of referring to collectors' numbers unless the special herbaria in which the plant is consulted is also added. While the numbers of certain collectors are almost always homogeneous and represent a single species, those of certain other collectors are notorious for the want of uniformity of the specimens, since the commercial rather than the scientific conception has governed their distribution.

4. The crying necessity for field workers to give more attention to the subterranean portions of plants and their habits of growth. In all of the large collections of the species described above that have been examined in the best herbaria, we are still in practical ignorance of the rootstock and growth characters of nearly all the species. To understand biological characters and relationships we must know more than the average specimens of a *hortus siccus* can reveal.

Explanation of Plates

PLATE 359

1. Lower pinna of *P. juglandifolia*; the outline drawn direct from Humboldt's plant in the Willdenow herbarium.
 2. *P. pumila* from Chiapas, Ghiesbreght.
 - 3, 4. *P. auriculata* from Chihuahua, Pringle, showing different development of the basal auricle.
 5. *P. umbonata*, Monterey, Pringle.
- All the figures are natural size.

PLATE 360

1. *P. juglandifolia* from Humboldt's plant in the Willdenow herbarium.
 2. *P. auriculata*.
 3. *P. remotispora*.
 4. *P. umbonata*.
 5. *P. nobilis*.
 6. *P. nobilis*, from the same leaf as No. 5 but slightly more magnified.
- The figures were drawn from the leaves by direct tracings with a Leitz projection apparatus, and are magnified about $2\frac{1}{2}$ diameters.
- Both plates were drawn under my direction by Miss M. E. Baker.
- COLUMBIA UNIVERSITY, 4 April, 1899.